

### REMARKS

In brief, this invention is a method of thermoluminescence dosimetry (TLD) that does not rely on filtering incoming radiation differently to a plurality of crystals but rather relies on bandpass filtering the frequency of the light emitted by each crystal during reading.

#### *Information Disclosure Statement*

The Examiner noted that some Sandia publications in the IDS were not adequately identified.

The "Angular Dependence" paper by Friedman was incorporated in a report "Technical basis for external dosimetry at the Waste Isolation Pilot Plant". This report is apparently located at the Nuclear Waste Management Program Library under call no.: DOE/WIPP-93-068. A copy of the source of this information from the Sandia Technical Library is attached.

The "Harshaw Dose" report has proved more elusive. According to the inventor it was never published, just used as a reference at Sandia. However, its teaching relates to determining the algorithm for determining the dose, and that teaching is also found in the cited Tawil et al. patent 5,572,027.

The paragraphs below are numbered to correspond to the items raised in the Office

Action:

#### *Objections*

2. The Abstract has been corrected.
- 3 – 5. The appropriate corrections have been made to the Specification.
6. Claim 10 has been canceled; the dependency of claims 11-13 has been corrected.
- 7 – 9. The mentioned claims have been canceled.

*Rejections under 35 U.S.C. §112*

12. Rejected claims 1-8 have been canceled.
14. Claims 1, 2, 4-6, 8 and 10 have been canceled. Claims 9, 11, and 13 remain rejected under 35 U.S.C. §102 as clearly anticipated by Attix.

This rejection is respectfully traversed.

Attix discloses a system where crystals A, B of *different* materials emit light within different wavelength ranges. The system uses two wide-range bandpass filters (31, 32 or 24, 25), where one filter passes all the light of crystal A and the other filter passes all the light of filter B. In other words, although crystals A and B apparently receive the same radiation, they naturally emit light in different (not one) passbands, and all the light from each crystal is passed to a detector.

Applicants amended claim 9 is directed to a method where multiple crystals of *similar* material (as taught at page 4, line 22) emit light over one passband that is a function of the physical properties of the crystal materials (page 2, line 22), and the light from each crystal is filtered to pass only a different portion of the light emitted by that crystal from that portion passed by the other filters. Since the claimed bandpass filters discriminate portions of the wavelength spectrum of light, the amount of light detected by each crystal is different, even though each crystal was exposed to identical amounts of radiation. In essence, the outputs of the detectors define a spectrum analyzer that reveals the frequency distribution of the light emitted from the crystals as a result of radiation exposure. Since similar exposures cause similar frequency distributions, the dose is easily determined from the frequency distribution once the system has been calibrated against known doses, as is conventional in the art.

A third system is the prior art mentioned in the Specification, where multiple crystals of similar material receive different amounts of radiation because of radiation filters.

Each of these systems are similar in the sense that multiple crystals receive radiation and have some variable factor that causes different amounts of light to be detected from each crystal, enabling the type of radiation to be identified. Each system has different variables. The claimed invention has the advantages of similar crystals (ease of manufacture and calibration) and no filtering of the input radiation (higher sensitivity, no angular dependence problems caused by the input filters).

In view of the amendment to the claims and the aforementioned discussion, withdrawal of this rejection is requested.

*Rejections under 35 U.S.C. §103*

16. Claims 3 and 7 have been canceled; claim 12 remains rejected under 35 U.S.C. §103 as unpatentable over Attix in view of Tawil, where Tawil teaches that it would be obvious to use four elements and filters in Attix instead of the three elements taught by that reference.

Applicant concurs that the use of four elements in Attix would be obvious in view of Tawil. However, since Attix does not teach the claimed structure of claims 9 and 11 (from which claim 12 depends), and Tawil does not supply the missing teaching of using pass band filters to pass only different parts of the light emitted by each crystal, withdrawal of this rejection is solicited.

*New Claims*

New method claims 14 – 21 have been added, all of which claims ultimately depend from claim 9.

Claims 14, 16, and 21 add the step of determining the dose calculation from the detected light. The mechanics for doing this step are known in the art, and it is referenced at the top of page 5 of the specification.

Claim 15 defines the pass band for the filters in terms of the filter pass bands given at page 6, line 7 and the crystal output given at page 4, lines 26, 27.

Claims 17 and 18 differentiate the invention from the prior art dosimeter wherein Mylar®, copper, and other filters are utilized in front of the multiple crystals (page 1, line 14) to provide different outputs from each crystal. These claims specify equal filtration (whatever protective cover on the dosimeter over the crystals might be construed as a filter) and no filtration (that is, no Mylar®, copper, etc filters). The advantages of this construction include improved angular dependence, as a filter is thicker for radiation penetrating it at an angle than it is for radiation penetrating it at 90° (page 2, line 1).

Claims 19 and 20 repeat claims 11 and 12 and depend from claim 17.

These claims further define the invention and are not shown by any combination of references.

#### *Conclusion*

The application has been amended to overcome the objections and rejections of the first Office Action. The case is now believed to be in condition for allowance, and such action is solicited.

Respectfully submitted,



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Applicant: Scottie Walker

Group: 2827

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For: *Thermoluminescence Dosimeters With Narrow Bandpass Filters*

Amendment

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